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BULLETIN

American Congress on Surveying and Mapping

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Editorial:

For Land Surveyors Only!

THE American Congress on Surveying and Mapping offers an excellent opportunity for the land surveyors to improve the status of their profession.

The practice of land surveying in the United States has always had a dubious professional standing. The conditions, under which it began and continues, were and are such that few men derive the major part of their income from land surveying; and accordingly, the standards of practice, except in unusual cases, have never been such as to lend dignity, prestige, or satisfaction to those who may properly be regarded as belonging to the profession. Usually a practitioner prefers to be known as a civil engineer rather than as a land surveyor.

Many other conditions, quite obvious to all, have affected adversely the development of the profession of land surveying. An important one has been the lack of a national organization to promote better methods of procedure and set standards of practice and ethics, both of which would elevate the plane of the profession. This need can now be met, and the cause of the land surveyors might be considerably advanced by the development of an active and vigorous Technical Division within the Congress. Such a Division could sponsor meetings which would provide discussions, national in scope, bearing on all phases of the subject, both engineering and legal, and the Congress publications would provide a means of dissemination and a forum which would be of the greatest value to the profession.

This opportunity should not be neglected.

WILLIAM H. RAYNER,
Vice President, Region 4.

OPPORTUNITIES AFTER THE WAR*

GEORGE D. WHITMORE, President

IN THIS DISCUSSION "opportunities" is defined as meaning the chance to be continuously employed, at useful work, at fair recompense. Furthermore, it is assumed that we are to consider opportunities for all branches and individuals of this widely spread profession—the government-employed surveyors and map makers, the instrument manufacturers, the professional cartographers, the commercial photogrammetrists—but most particularly the private practitioners and the county and city surveyors. Of course it is almost bound to be true that if one branch or part of the profession is profitably busy, all other branches will be gainfully engaged also. In other words, what helps one group helps all.

No one can try to look into the future after the war without wondering what kind of a country and world we will be living in. Will there be a long uncertain transition period in which unemployment is a major problem and in which a large public works program will be undertaken? Or, will there be a long period of sustained prosperity in which private industry will take up all unemployment slack, with good wages for all? Will the United States, either through Government or private industry, or both, undertake to assist the other countries of the Western Hemisphere in developing their resources, by sending our surveyors and engineers into those countries? Will United States citizens be called on to assist in the engineering work of rehabilitating the war-damaged parts of Europe and Asia? There are so many prospects and so much to be done, while at the same time there is so much uncertainty as to what will actually happen, that it is difficult to be at all confident in making forecasts of this sort. Obviously the volume and kind of work available to the surveying and mapping profession will be dependent in some degree on whether we have good times or bad times, and on the extent of cooperation with other countries.

A NEW APPRECIATION OF SURVEYS AND MAPS

Regardless of the economic situation after the war, it does seem certain that, because of the many war activities requiring the use and knowledge of maps and survey data, there will be thousands upon thousands of citizens who will have a new appreciation of the value of, and need for, good up-to-date survey and map data. This fact alone seems to indicate that the surveyor and mapmaker will have less trouble in the future in getting people

* Presented at Annual Meeting, Washington, D. C., June 5, 1943.

to recognize the value of his services and his products. It also follows that people will be more discerning as to the quality of surveys and maps—they will be more insistent on good work, and not so easily fooled by the rapid, low-cost, reconnaissance-type products. So, to say the least, the profession should have a more appreciative clientele after the war than before. That much is on the right side of the ledger, and augurs well for better opportunities than have been available heretofore.

As to whether or not public officials, managers of industry, and ordinary citizens will voluntarily seek out members of our profession to do large amounts of new work is another matter. Judging by past experiences, it seems doubtful. It is probable, even though there is a more appreciative public, that the surveyors and mappers will still have to engage in the business of selling and promoting their work. In other words, the opportunities will probably be greater after the war, because there will be real need and greater need for more and more surveying and mapping work, but at the same time there may still have to be done a lot of spade work in digging out these opportunities. Lots of worthy things should be done that do not get done because of inertia, or because there is in sight no immediate profit in dollars and cents, and for other reasons. For instance, most of us realize that preventive medical care is much better than waiting to get sick and then trying to be cured. But how many of us actually undertake yearly physical examinations—or pay a doctor to keep us well, rather than cure us after we get sick. Another similar thing is city planning or community planning. Practically everybody recognizes that this is a good thing, but how many communities actually get down to the serious business of detailed planning. The works of the surveying and mapping profession are somewhat similar to the two examples just cited. The surveyors are usually not called in until there is a rush project to be built, or serious litigation looms, or a war emergency is on us. Then of course they have to do uneconomic and unsatisfactory work—although most everybody really knew all the time that certain survey and map projects should have been going forward. And so, after the war we may find that there are plenty of people who recognize the need for the work surveyors and mappers do, but who just will not get around to doing anything about it, unless they are pushed.

Profession Must Assume Initiative

The theme of this discussion may therefore be briefly stated as follows:—that after the war, regardless of the economic situation, there will undoubtedly be plenty of opportunities for the surveying profession profitably to serve the country and the world, but these will likely be latent or potential oppor-

tunities, and that the surveying and mapping group will itself have to do something about it if it expects to capitalize on these opportunities. We, meaning the surveying and mapping profession, won't be able just to sit back and wait for people to seek us out with attractive propositions. Instead we will have to switch from passivity to aggressiveness, and educate our clientele to realize what works need to be done for their own good. We will have to do some pushing. How better could such pushing be undertaken than through an organization such as the American Congress on Surveying and Mapping, especially through state and community sections of the Congress for projects in local areas?

The assumption that there will be opportunities for this profession after the war is based on the premise that there is much work which should be done—work that will return its cost many times over through better planned projects, savings in construction, less litigation, and in many other ways. The skeptics will want to know just what are these surveying and mapping projects that are so desirable and pay such good dividends. A complete list of them would be too long for this short discussion and also might give rise to some controversy here and there. But a short list can be given, of projects which will have almost unanimous engineering approval, projects which may be identified as of the "grass roots" variety, and which over a period of years will inevitably produce money savings many times exceeding the original cost.

Nationwide Projects

Confining the list to the United States area only, and taking first only nationwide projects, scarcely anyone will dispute that there are two important survey and map works which should be completed at the earliest possible time. There is first the nationwide network of geodetic control, with precise triangulation or traverse monuments spaced every 10 or 12 miles on the average; with precise level routes spaced every 6 or 7 miles on the average. These geodetic surveys are the foundation for all mapping of any sort by any agency, and also for the more detailed geodetic control surveys of states and local areas. The second nationwide project which should be completed as quickly as possible is the series of standard topographic quadrangle maps, so familiar to all of us, and rapidly becoming familiar and useful to the public at large. In this connection we should not lose sight of the fact that maps of this type, to be of the greatest value, must be constantly revised to be up to date. Most of the talk heretofore has been about making the original maps—rarely any talk about the work of periodically revising and reprint-

ing the map, but this is nevertheless an important part of any nationwide mapping program.

State and Local Projects

Next, there is need in every state for a statewide geodetic control survey, with well-monumented first- and second-order traverses and level lines located along all state highways and other important routes. These control surveys should form an interlaced network with lines spaced about every 2 or 3 miles apart on the average.

For the county project, there is the self-financing tax and assessment map. Every county should provide itself with a large-scale, accurate set of cadastral maps, which will show the boundaries, corner markers, improvements, dimensions, area, and ownership on every property tract outside of incorporated municipalities. In strictly rural areas such maps can be compiled at remarkably low costs, through the use of aerial photographs and federal and state geodetic control surveys. It has been demonstrated that these maps will usually pay for themselves in a short time, through discovery of unlisted and untaxed areas.

In every city and metropolitan area (these comprise more than 50 percent of the total population of the United States), there is urgent need for a whole series of surveys and maps, as described in considerable detail in Manual No. 10 of the American Society of Civil Engineers. These are, briefly, a closely spaced network of precise horizontal and vertical control surveys, well monumented, having a spacing of about every one-quarter to one-half mile on the average; a series of large-scale, accurate, and detailed topographic map sheets; a series of property map sheets showing dimensions, improvements, corner markers, and ownership of every lot and tract of land, including streets and publicly owned lands; a series of maps known as underground record maps, paralleling and similar to property maps, but showing all information on the underground and other utilities; and last but not least, an accurate street map published in both desk size and wall size.

It seems clear that, if only a part of this short list of publicly financed projects were to be authorized, there would be enjoyable and profitable employment for every member of the surveying and mapping profession for the next generation. And many other worthwhile activities could be included in such a list which, over a period of years, would more than pay their way. For instance, it would be practical, from an economic standpoint, to provide new aerial photographs every 5 to 10 years, of certain areas of each county and each city. Of course the time is not yet here when all of the

economic uses to which photographs can be put are known. Certainly we have not yet reached the time when the ordinary private surveyor or county surveyor knows how to derive anything like full benefit from the use of such photographs. The time will surely come, however, when aerial photographs and their measuring instruments will be as much a part of the surveyor's equipment as are his transit and level. Hence the periodic reflying for new aerial photographs every 5 to 10 years would seem to be justified, if only to provide the surveyors and map makers, both public and private, with up-to-date information. Yet obviously these uses of aerial photographs are only a small fraction of the many other uses which can be and will be made of them.

Then there is the probability that a whole new era of discovery and prospecting of natural resources will develop after the war, in the United States, the Western Hemisphere, and for that matter throughout the entire world. This will likely come about not only because of the need and desire to discover and exploit these resources, but perhaps more because there will have become available, as a result of war activities, new surveys, new aerial photographs, and more and better maps of previously unmapped and undeveloped areas. Obviously such activities will provide an incalculable amount of pioneering work for surveyors and mappers.

The Need for Organization

It is always possible that after the war conditions will be such that for many years all surveying and mapping people will be so busy doing postponed emergency-type work that there will be little inclination to organize the promotion for the kind of projects listed here. But suppose things work out so the surveying and mapping group has to dig up its own projects, and this turns out to be so successful that it develops there is more to do than the profession in its present state can handle efficiently. What then? Is the profession capable of rapid expansion without loss of professional status, or without lowering of work standards? No one knows the answer to that question, of course, but to be on the safe side, it seems we, the entire profession, should as rapidly as possible so organize ourselves that regardless of what happens we will be able to take it in our stride. So what should we be doing, or be getting ready to do immediately when the war ends, to be able to take care of not only a greatly expanded profession, but also to safeguard and improve the status quo?

To begin with, it would seem, we should try to become a more truly professional group, and with a closer and more compact organization. To accomplish this we need to attract high grade men into the work, and this

could well begin in the colleges and universities. We should try to make surveying and mapping work a more satisfying lifetime career than it has been. We should try for uniform state license laws, and encourage full licensing reciprocity between states. We should try to get each state to pass enabling acts not only permitting, but ultimately requiring, the use of Statewide Plane Coordinate Systems. We should adopt uniform accuracy standards for the various principal types of surveys and maps, including the ordinary property boundary survey. We should continually strive to raise standards of performance, at the same time lower costs. Lower costs should not mean reducing fees or salaries—on the contrary, it should mean exactly the opposite. We should strive to raise the personal compensation, but lower the costs through improved performance, and new and better instruments and techniques. (Incidentally, here is where there are unlimited opportunities—the developing of new and better instruments and techniques.) Many of these various efforts to improve the professional and economic status of surveyors and mappers, as well as improve the work and lower its cost, obviously can be best accomplished by group or organization action. So again we are confronted with the conclusion that the American Congress on Surveying and Mapping will fit just right into the situation after the war.

Summary

In summary, the outlook as it appears to be at this time, and the actions which seem desirable to take, are:

1. The opportunities are uncertain. There may or may not be an unlimited amount of work to do. It is best therefore to be ready to promote useful publicly-financed surveying and mapping projects.

2. There will be a more understanding and appreciative clientele after the war, hence such promoting should be somewhat less difficult.

3. The profession should insure its services being more in demand, and easier to obtain, by raising performance standards and lowering costs.

4. Many of these objectives can be best accomplished through a semi-professional organization of surveying and mapping people—therefore the American Congress on Surveying and Mapping should be continuously expanded and made strong and ready to help after the war.

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Editor's Note:—In connection with the above article by President Whitmore, members' attention is called to the comprehensive report on "Postwar Construction," prepared by the Committee on Postwar Construction of the American Society of Civil Engineers and published in Civil Engineering, September, 1943.

SURVEYING AND MAPPING IN CANADA

F. H. PETERS, Surveyor General of Canada

IN 1554, some fifty years after the discovery of the New World, Sebastian Cabot produced a map indicating with some clarity what is now Canada; since that time Canada has been progressively depicted by discoverers, explorers, surveyors, geologists, and trained topographers and hydrographers.

The first legal survey in Canada was made in the now Province of Quebec, in 1626, by Samuel de Champlain founder and first governor of New France, and the first organized and accurate map was that of Prince Edward Island, in 1764, by Admiral Samuel Holland, under instructions to proceed with a general survey of British North America.

For the most part the earlier maps of Canada were compiled from collections of legal surveys made for the disposal of Crown Lands and from information gathered from the reports and sketches of explorers. Some progress was made too in charting the shores of both the East and West Coasts, and in 1791 Captain Vancouver of the British Admiralty began the survey and charting of the coastline of Vancouver Island and the shore of the mainland from the Strait of Juan de Fuca to latitude 60° north.

Early surveys were controlled only by magnetic compass and measurements by the link chain, and it was not till about 1867 that the theodolite came into use. Since then, except for certain improvements in the construction and practicability of theodolites and the replacement of the link chain by the steel tape, little basic change has been made in ground survey instruments.

In the provinces of Ontario, Quebec and the Maritimes, legal surveys for land disposal followed rather than preceded the trend of settlement and it was only in more recent years that any comprehensive and coordinated system of survey was established. Settlement and the necessary subdivision surveys followed the larger waterways and coasts. Counties, some large, some small and of no regular or uniform outline, were laid out fronting on these waterfronts, with their lateral boundaries more or less perpendicular to the general trend of their own waterfront and extending inland varying distances as the particular area seemed to demand.

Contrasted to this procedure is the survey of the western provinces, covering the great fertile prairies.

THE DOMINION LAND SURVEY SYSTEM

In 1870 the first comprehensive and accurate system of survey was initiated with the Dominion Land Survey system to meet the demand for orderly

disposal of the millions of acres of rich agricultural lands in the prairie provinces.

The Dominion Land Survey system is a rectangular system of townships and ranges, based on astronomic observations for bearing with due allowance for convergence of meridians. The use of the magnetic compass in projecting governing or any other lines is not permitted.

The governing lines are selected meridians and base lines. The Principal Meridian at the fourth base line is in longitude 97° 27′ 28.4″ and the surveys are based on it both to the east and west. To the west of the Principal Meridian, five other meridians of reference, at a spacing of 4 degrees of longitude (102-118) have been established and each controls the interval westward to the next. Base lines are on the north of every fourth township north of the 49th parallel and are chordal for each township, placing the corners of each township on the corresponding parallel.

This survey is one of the most accurate and covers the largest single area of subdivision under one comprehensive system of survey in the world. Incidentally the fourth meridian west is the longest surveyed straight line in the world—a distance of 762 miles.

This large accurate survey grid is ideal for mapping control and has given the finest example extant of perfect connection between the topographic map and the cadaster.

Development of Surveying and Mapping

A great disparity has always existed between the small population and the large area of Canada, and this condition has had a marked effect upon its surveys and mapping program. To adequately map great areas costs large amounts of money, which is a serious burden for a limited number of taxpayers. However, this situation has its bright side in the earnest efforts of those in charge of surveys to obtain the best possible results for the money expended and to develop technical methods for accuracy, speed, and economy.

In this connection may be mentioned the ground survey camera photographic method introduced by Dr. E. Deville in 1886 and used in mapping the western Cordilleras, and the aneroid barometer method begun in 1891 for contouring the sectional maps of the western provinces.

The photographic survey work done in Canada is noteworthy because nowhere else in the world had it been carried on so extensively and so successfully.

About the year 1900 the need for geodetic control, particularly in the eastern provinces, was recognized and a geodetic survey service was set up, directed by Dr. W. F. King. There was also a widespread demand

by both military and civilian organizations for accurate one-mile topographic maps in the more closely settled districts of the eastern provinces. This demand was partly met by what was termed the Standard Topographic Series, which up to 1933, when it was discontinued, covered the southerly parts of Ontario and Quebec, the Maritime Provinces, and a portion of southern Alberta and British Columbia. The maps were issued on two scales (3.95 and 7.89 miles to an inch), but produced nothing new as they were compiled from existing information and without contours.

In 1904 the Geographic Section, Department of National Defence, began the survey and publication of one-mile topographic maps. The sheet boundaries were defined by graticule lines so that all should fit together without gap or overlap, and a high standard both of survey practice and cartography was maintained. In the same year, the British Admiralty, who had previously carried on hydrographic surveys of Canada's coasts, requested that this work be taken over by Canada.

The Canadian Hydrographic Survey established about 1883 and whose work had been largely restricted to the Great Lakes was extended to include the coastlines of Canada. The accurate charts produced by it have made an important contribution to the mapping of the Dominion.

The development of the aeroplane and air camera during the World War (1914-1918) was to revolutionize methods of topographic mapping. In Canada, within the vast northern areas of unsurveyed territory are great resources of minerals, timber, and water-power, and maps are a prime necessity for their development.

The technique of mapping from air photographs was pioneered by the then Topographical Survey of Canada; maps of areas far beyond ground survey control were produced, using a limited number of astronomic observation stations for control of each map sheet.

It may be fairly said that in air survey mapping, particularly from oblique photographs, Canada has taken a prominent part and has produced reliable maps for the development of resources in the hinterlands.

The National Topographic Series

Perhaps the most important of Canada's mapping programs was the initiation and development of the National Topographic Series, which was established by the Topographical Survey Branch in 1924, under the direction of the writer.

The National Topographic Series is an index designed to cover the whole of Canada, and is based on a conformal projection (the transverse Mercator). It divides Canada into lunes, eight degrees of longitude

in width and four degrees of latitude in depth, the intercept in each lune giving the unit sixteen-mile sheet. Each sixteen-mile unit is regularly quartered into eight, four, two, and one-mile to the inch sheets, with suitable designation by numbers and letters. The graticules form the boundaries of the map sheets so that there is no overlap or gap between adjoining sheets.

The grid designed for the Series is in four-mile squares, has the same origin as the projection and is continuous over each lune only. It is in this Series that most of Canada's recent maps are indexed.

The production of a National Topographic Series, a national necessity for every modern and progressive country, is dependent on an accurate set of base maps. First we have an organized system of map sheets, each with its geographic position predetermined, so that when all sheets are completed there are no gaps and no overlaps and the scale and cartography of all sheets are the same. The accurate base map shows all natural and cultural features and contours. On this base map may be added any type or class of data, and maps produced for the orderly and economic development of the country's natural resources and cultural improvements.

For a short period prior to the outbreak of war and continuously ever since, the mapping and charting programs of Canada have been diverted entirely to the needs of the War Services, and it may be said that the maps required by a nation at war reach into the millions each year. With the exception of a few special sheets urgently needed at the beginning of the war and a few strip maps along air routes and the Alaska Highway, the maps produced for war purposes have all been made from base topographic sheets where these are available and all conform to the National Topographic Index. Even the demand for air charts was met by using the eight-mile topographic base ground map with certain modifications and a coloured overprint to show air information.

The need for good topographic maps is not peculiar to Canada; it is universal. An excellent statement of the case is from an old report of the then Royal Survey Department of Siam:

> Not only is science in general benefited, but every branch of the industrial and commercial development of a country is advanced, if good topographic maps are available. The general administration in all its branches, the location of railways and highways, the planning of schemes for water supply, for irrigation and drainage projects, the installation of electric transmission lines, even the location of the boundaries of reservations and holdings are all dependent on the supply of good topographic maps. Therefore, in order to mobilize all the available resources of this country and to enable them to be exploited to the best advantage, it is expedient that all territory within its borders should be triangulated and topographically surveyed at the earliest possible date.

THE NORTH-WEST PASSAGE AND THE ALASKA HIGHWAY — A CONTRAST

TWO NOTABLE events have occurred at about the same time—the successful negotiation of the North-west Passage from west to east and the opening of the Alaska Highway.

The only crossing of the North-west Passage till now has been that of Amundsen, who crossed from east to west in 1906; the one just accomplished was that of the Royal Canadian Mounted Police patrol ship *St. Roch*, of 8 tons. She started out from Vancouver, and the voyage took two years and three months. One of the crew died owing to the severity and hardships of the climate, but the rest arrived safe and well at Sydney, Nova Scotia. The vessel possessed two-way wireless, and was able to keep in touch with the outer world throughout. Details of the voyage are kept secret, but when the full account is given to the world it will be received with breathless interest. Captain Larsen, a Dane, commanded the *St. Roch*.

In contrast with this leisurely trip's arrangements is the almost incredible speed with which the Alaska Highway has been constructed. The entire length of the Canadian "Burma Road" from Edmonton, Canada to Fairbanks, Alaska is 1671 miles, and has been opened for truck traffic in a little over six months from the start. Ten thousand soldiers and two thousand civiiians have been engaged in the work under the Public Roads Administration. The roadway is 24 feet wide, and ditched on both sides, and bridges 200 streams and rivers. The highest altitude, between Fort Nelson and Watson Lake, is 4212 feet.

The difficulties encountered in the construction have been enormous. Much of the road had to be cut through dense forests, where giant trees grew so close that it was impossible to pass between them on horseback. Much was through deep and sticky mud which has hitherto been impassible in the rains, but which, with a few hours of sunshine, dries to the hardness of concrete. Not least of the difficulties was caused by the agonizing bites of mosquitoes, black flies, horse flies, and deer flies.

But possibly the worst and most difficult part was crossing the muskeg—country like a peat bog, sometimes as deep as 25 feet, and so treacherous as to swallow completely the huge caterpillar tractors. Here the road had to be "corduroyed"—that is, a foundation laid of heaps of boughs laid flat and covered with logs laid across the road and close together like a piece of corduroy, and on this is laid the earth surface. The sides of the corduroy road are ditched like the rest.

The huge road-making plant for which America is famous has simply pushed primeval country out of the way and left a motor road in its wake—caterpillars, bulldozers, winches, cranes, derricks, ditchers, machinery of which in this country we have no idea, have roared over the land and made the peaceful forest and tundra a pandemonium. And already trucks holding men and munitions are roaring over it to hold the Japs and make a counter-attack possible.

Speed has been the first essential; there was no time for office planning. The surveyors were only thirty miles in front of the leaders of the construction party, and the impossible has been accomplished.

The road now reaches Fairbanks, but its course after that is a military secret.—*"The Scottish Geographical Magazine," December, 1942.*

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NEW APPROACH TO ALASKA HIGHWAY

Three routes for a $6,000,000 highway linking the main road networks of British Columbia to the Alaska Highway are now being surveyed. Two survey parties are mapping out these routes for the highway which would facilitate transportation of essential war equipment to the Alaska Highway, Premier John Hart has announced. The first route under survey is an extension of the road from Finlay Forks; the second a link through Pine Pass, and a third a link through Monkman Pass.—*"Engineering News-Record," October 7, 1943.*

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RECENT TRIANGULATION IN ALASKA

The U. S. Coast and Geodetic Survey announces the completion of the first-order triangulation from Skagway, Alaska to Whitehorse, Yukon Territory, and thence along the Alaska Highway to a connection to established triangulation at Big Delta on the Richardson Highway directly south of Fairbanks, Alaska. Triangulation has also been extended from established surveys at Ruby on the Yukon River westward to Unalakleet on Norton Sound, thence northward and westward along the Seward Peninsula to Teller on Port Clarence. The completion of this triangulation will enable the geographic positions of stations in Alaska to be placed on the North American datum of 1927.

TOPOGRAPHIC SKETCHES FROM CONTOUR MAPS*

WILLIAM A. WHITE, Assistant State Geologist, North Carolina

THE USUAL METHODS of making topographic sketches or block diagrams from the data contained in contour maps necessitate foreshortening the contours in order that they may appear as they would were they viewed from some intermediate angle between the horizontal and the vertical. Heretofore this foreshortening has been obtained through freehand sketching or the use of modified pantographic devices. Several such methods have been described by Lobeck.[1]

Recently the author had need to construct a block diagram of a large area in the northwestern part of Georgia, and in the search for a more simple procedure to foreshorten the contours the methods described below were developed. This paper is presented in the hope that they may be of some service to others.

Two separate methods are described. The topographic drawings resulting from them differ in that one is a true perspective drawing, whereas the other is a parallel projection similar to those obtained by the earlier methods.

DRAWINGS IN TRUE PERSPECTIVE

The first or true perspective method depends upon the use of photography. The topographic sheets are joined together and the important contours are made to stand out prominently by going over them with India ink and a small ballpointed reservoir pen. An orientation line is ruled across them to mark the desired orientation of the block diagram. The composite map is then laid on the floor and photographed. The camera is mounted on a tripod and placed on that side of the map which will represent the front edge of the desired block diagram. Orientation is made by placing the axis of the lens in the same vertical plane as the orientation line on the map. The camera is then inclined at whatever vertical angle is desired and the finished block diagram will appear as though it were viewed from the same angle. The distance at which the camera is placed may be determined by examination of the image with a ground glass plate. In general it is advisable to place the camera as close as it can be brought without causing distortion of perspective in the image.

* Reprinted through the courtesy of the American Journal of Science, August, 1943.

[1] Lobeck, Armin Kohl; 1924, Block Diagrams, John Wiley and Sons, New York City, pp. 138-145.

In making the block diagram for the project in question, the maps were first reduced in scale by photographing them from the perpendicular in four parts. The prints of these four component parts were then assembled and rephotographed at a vertical angle of 30 degrees with the horizontal. In the latter photograph the meridians will be found to converge toward the back of the map and the scale of the map becomes increasingly smaller from the front to the back. This enables the finished drawing to take on the true proportions of a perspective view, so that a topographic form of any given size would be shown larger if it appeared in the foreground than it would were it to appear in the background. For the purpose of pictorial representation this may be considered an advantage over the uniform scale of the parallel projection derived from the usual method.

The process of taking the contour lines off the foreshortened map is described by Lobeck.[1] No change in the method as described by him is necessary if it is not considered requisite to make the vertical scale vary with the changing horizontal scale. However, if this is desired, the map may be divided before it is photographed into a number of zones of equal width which cross the orientation line at right angles. Then when the contours are being taken off the foreshortened map, a small interval may be used between them in the most distant zone of the background and increasingly larger intervals in the successively nearer zones of the middle and foreground. By this means the relation between the horizontal and vertical scales may be kept approximately uniform throughout all parts of the topographic drawing.

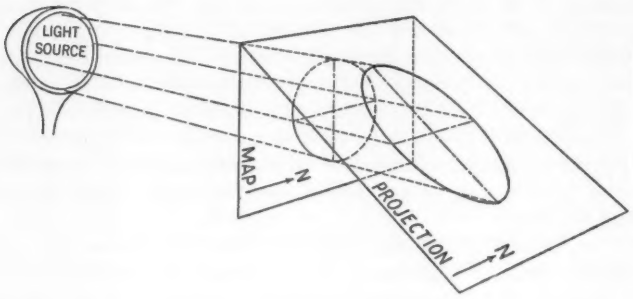
If it is desired to have the finished topographic drawing broken along cross-section lines for the purpose of showing geologic structure, it is necessary to cut the original map along these lines and offset the several parts before the inclined photograph is made. This is necessary in order that the several parts of the finished topographic drawing may have common vanishing points.

Parallel Projections

If it is desired to make a parallel projection rather than the perspective drawing described above, this may be accomplished, without the use of pantographic devices, by the following method:

The important contours are picked out with India ink as before, and the map is then photographed from the perpendicular. An enlargement is made on line film and mounted on the device shown in the figure. This is easily made of corrugated cardboard and a sheet of glass. The print of the map

is mounted on a frame of corrugated cardboard and a piece of tracing paper is placed over the sheet of glass which occupies the position labeled "projection" in the illustration.



A single automobile headlight is used as the light source, and if it is placed at a distance of forty or fifty feet, the light rays reaching the map will be essentially parallel and a parallel projection of the map will appear on the tracing paper. The foreshortened contours may then be traced off from the projection and the drawing may be completed in the usual manner. The work can be done in a garage at night with the car backed off to the requisite distance and one of its headlights blinded. It is well to remove the lens from the headlight in use.

It will be noted that in the figure, the north-south line is horizontal and the projection has a larger transverse scale than the print of the map.

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RECORD TVA CONSTRUCTION

The Tennessee Valley Authority has set a new construction record in its completion of Douglas Dam. The gates were closed and power output started less than 13 months after the dam was authorized by Congress on February 1, 1942.

The dam has a spillway section 505 feet long with 11 gates, 32 feet high by 40 feet wide; two non-overflow sections, 864 feet long; powerhouse intake section, 313 feet long, making the concrete dam 1,682 feet long and 161 feet high. It contains about 500,000 cubic yards of concrete. In addition, the project includes the construction of eight earth saddle dams around the rim of the reservoir. This installation adds 100,000 kilowatts to the Valley's electric system.—*"The Set-Up," August, 1943.*

Federal Surveying and Mapping Agencies

This is another in the series of sketches on the history, purpose, and scope of activities of federal agencies engaged in surveying and mapping.—EDITOR.

THE U. S. FOREST SERVICE*

DEPARTMENT OF AGRICULTURE

The Forest Service was established under the Department of Agriculture in 1905. In addition to many other duties, it is a public land management agency, through being charged with the administration, protection, and utilization of approximately 275,000 square miles of federally owned land, comprising 160 National Forests, 34 Purchase Units, and 14 Experimental Areas. The Forests are located in 42 states and 2 territories, Puerto Rico and Alaska. The largest National Forests are in the western part of the United States and in Alaska, but important though smaller Forest units are located in the eastern, southern, and northern states.

ADMINISTRATION

The headquarters office is located at Washington, D. C. The management of the National Forests is decentralized. Ten Regional Offices are advantageously located in the continental United States and Alaska. The number of National Forests under the jurisdiction of a Regional Forester varies from 2 in Alaska to 25. Each Forest is administered by a Supervisor, who is also responsible for the work of the Forest Rangers, in charge of Ranger Districts. The latter are assisted by Forest Guards.

The activities and administration of the National Forests include the following:

Fiscal Control
Fire Control
Timber Management
Range Management
Recreation and Lands
Engineering
Wildlife Management
Watershed Management
State and Private Forestry
Personnel Management
Silvics
Forest Economics
Range Research
Forest Products
Forest Influences
Operation
Information and Education
Acquisition of Lands
Forest Land Planning

* Prepared in the Office of the U. S. Forest Service.

Among other activities, the Engineering Division is responsible for surveying and mapping. Maps are prepared by the Forest Service for general administrative use or for use in connection with one of the above activities.

Surveys and Maps

To administer the National Forest areas in a manner to best protect, develop, and utilize the resources, it is necessary to have maps on large enough scales and in sufficient detail to show clearly all drainage and culture. A high degree of accuracy is not needed in the surveying work done for the preparation of Forest Service maps. Planimetric maps usually meet the needs. These are used as the base for showing timber, grazing, and other resource data as well as administrative, fire protection, and other information. Topographic detail is not universally needed but occasionally is required.

In the preparation of these maps the surveys and maps of other federal agencies are used whenever available to an accuracy and detail required by the Forest Service. However, for many Forest areas, there are no available satisfactory surveys. Where other federal agencies cannot map these areas in time to serve urgent needs of the Forest Service, it is necessary for the Forest Service to make the surveys.

Maps of the individual National Forests are most essential and the most widely used of all maps. These maps are compiled from all available authentic sources and are lithographed by government bureaus or on contract by commercial firms. The Forest Service is not primarily a map-making agency, but its maps, prepared mainly for its own official use, are available in limited quantities to other federal agencies, to officials of other cooperating nations, and, to some extent, to the public. They are furnished free of charge for official use, but a nominal charge is made to the public to cover the cost of lithographing. In addition to the administrative maps of the National Forests, there are printed recreational and informational map folders, carrying descriptive matter as well as maps. These are mainly for distribution to tourists and campers in the National Forests.

When it is necessary for the Forest Service to make a survey of a National Forest or a portion thereof—a Ranger District, an Experimental Area, a Grazing Area, a Recreational Area, a Timber Sale Area, a Forest Boundary, an Acquisition Tract, or other similar subdivision—the work is done under the supervision of the Division of Engineering. A Regional Engineer is located in each of the ten Regional Offices, and assisting him are experienced engineers, surveyors, and draftsmen.

Aerial photographs, when available, are used to great advantage in range reconnaissance, timber estimating, and for other Forest activities. The

demand for such photographs is rapidly increasing, this evidencing growing appreciation of their value for practically all kinds of Forest resource administration and management. Photographs on a larger scale than ordinarily used in map making are usually preferred because of the greater amount of detail.

If feasible, aerial photographs are taken of the area and planimetric maps compiled by using these photographs in combination with ground control and timber and grazing reconnaissance. Cadastral surveys are made of boundaries and tracts of land purchased or transferred. The methods used and the density of detail vary with the type of the terrain and the needs of the map, but the standards established for all federal mapping projects are adhered to. The compilation scale is usually 1:31,680 (2 inches = 1 mile).

Vertical and horizontal control data established by the Coast and Geodetic Survey, the Geological Survey, the War Department, and other reliable sources are used, but it is often necessary for the Forest Service to establish additional third- and fourth-order control for accuracy and detail in areas flown or surveyed.

National forest administrative maps are practically all published on the scales of 1:126,720 (1/2 inch = 1 mile) and 1:253,440 (1/4 inch = 1 mile), although some are published on the scales of 1:31,680 (2 inches = 1 mile) and 1:63,360 (1 inch = 1 mile). However, all maps are not published on all four scales. They are usually in National Forest Units, Divisions of National Forests, Ranger Districts, or quadrangle units bounded by latitude and longitude lines. Most of the maps are planimetric only, but contours are desirable and are used on some of the larger-scale maps if available.

The National Forest maps vary in the amount of data carried in addition to the drainage and culture. Overlay printings in colors show status of lands, main motor highways, fire organization data, azimuth circles centered over lookout stations, recreational data, forest types, range types, etc.

In addition to the regular administrative maps and the recreational folder maps, there are published from time to time special maps, on various scales and in forms suitable for the requirements and uses of these maps. General maps of the United States show the relative location of National Forests with the reservations of other federal agencies and the states. Usually, a base map, prepared by some other map-making bureau, is used to superimpose Forest Service data.

Maps of states or U. S. Geological Survey quadrangles are used to show, in color overlays, the Forest Survey types, where such data are available in sufficient detail and accuracy to justify the publications.

War Mapping

For the duration, regular surveying and mapping activities of the Forest Service have been practically eliminated. However, a large program for the War Department has been carried on. The Forest Service has accepted three war-mapping assignments of the Engineer Corps. The total area is approximately 6300 square miles. One assignment is completed; one will be finished in the fall of 1943; and completion of the third before June 30, 1944 is required.

A fairly large program of aeronautical approach charts for the Army Air Forces has been completed. This included 29 charts, covering a total area of 192,697 square miles. Much miscellaneous surveying, mapping, and photographic work has also been done for the Army, Navy, and war agencies.

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AREAS OF THE UNITED STATES, 1940

For the first time since Henry Gannett, Geographer of the Tenth Census, "laid the foundation for accurate and detailed area measurement in the United States" in 1881, the Bureau of the Census has completely remeasured the total area of the United States and of the individual states and counties. Furthermore, for the first time in history the Bureau has measured the areas of all the minor civil divisions in the country. The results are tabulated and discussed in a report entitled "Areas of the United States, 1940," prepared under the supervision of Clarence E. Batschelet, Geographer of the Census, in which maps of the states showing the minor civil divisions are also presented. The areal measurements were made on the basis of the best available large-scale maps and in the light of newly refined definitions of land and water areas.

The new figure for the total area of the continental United States is 3,022,387 square miles and for the outlying territories and possessions 597,257 square miles. Tabulated separately by states but not included in the state and national totals are 74,364 square miles of "coastal waters," consisting for the most part of the open waters of the Great Lakes within the international boundary and of certain deep embayments such as Chesapeake Bay, Long Island Sound, and Puget Sound.

The report brings out the fact (without, however, giving the precise figure) that there are 3098 counties in the continental United States. It states that the average size is about 1000 square miles, but as the average is unduly raised by certain very large counties in the Far West (San Bernardino in California, with 20,131 square miles, is nearly the size of West Virginia), the median, 618 square miles, is a more meaningful figure. There are no fewer than 51,627 minor civil divisions, ranging in area from less than a square mile to 10,538 square miles (Tonopah township, Nev., which is larger than Maryland). They are designated by a variety of terms: 20,487 divisions are "civil townships," and 10,819 are "election precincts"; in Mississippi they are "beats," in Louisiana "police jury wards"; certain unorganized townships in northern New England are called "gores," "grants," "islands" (147 in Maine), "patents," "plantations," "points," "strips," or "surpluses."—*"The Geographical Review," July, 1943.*

EDUCATION AND TRAINING FOR SURVEYING AND MAPPING*

PROF. PHILIP KISSAM, Princeton University

THE QUESTION of bringing up the young, of which higher education forms a part, is a perplexing one at best. Today, with an increasing interest in the subject, many articles are written about the relationship between child and parent and child and teacher. It is worthy of note that a large majority of these articles are written by bachelors and spinsters. When higher education is discussed, it is usually found that the writer himself is not an educator. This situation arises not because parents and educators are averse to setting down their thoughts on paper. A very large proportion of writers *are* parents and educators. But when one has been in close contact with the problem for a number of years it becomes apparent that the difficulties involved are greater than appear at first glance, that the subject is far more complicated than one would suppose, and that despite the various theories that arise from time to time, the solution is after all highly empirical.

Engineering education as it stands today has been moulded to its present form by continuous pressure from three directions: The older alumni and the employers of engineering graduates are continually looking for an increase in the capabilities of the young graduate; the educator is directing his thoughts toward perfecting the means to this end; and the third controlling factor is the student himself whose natural abilities at college age has, of course, definite limitations.

As a result of these forces, engineering education has developed into a rather stable program which gradually and steadily improves as the years go by. The alumni and the employers have a rather definite idea of what to expect of an egineering graduate and the educators have learned what is necessary to produce this result. The test of the system is that it seems to work.

In this moulding process the various courses that make up the whole of an engineering education have taken on certain elements necessary to the training of the engineer not specified in the descriptions of the course content. The subject matter of any particular course or set of courses, therefore, cannot be considered by itself but by the part it plays in the general plan of an engineering education. When a study is made of the courses dealing with surveying and mapping, it must be borne in mind that these courses must not only train the student in how to survey and how to make a map

* Presented at Annual Meeting, Washington, D. C., June 5, 1943.

but in many other engineering requisites as well. The particular requisites assigned to these courses are those which these courses can best produce.

For example, every successful civil engineer must handle men. The survey field parties give him this opportunity. An engineer must learn to check his work. The mathematical checks in surveying courses provide this training. He must learn the danger and ease of making mistakes. A few survey closures will demonstrate this to him. He must understand how to measure things, the effect of repeated measurements, and how to handle accidental errors. These are taught in surveying. Surveying along with engineering drawing are usually the first professional courses which the student engineer receives. The course in surveying is relied upon to give him the principles of the engineering approach. He learns the necessity of reconnaissance or a general view of the problem, the importance of the preliminary survey or the collection of important data, the arrangement of the data in a workable form or a map, the development of the plan utilizing these data, and the execution of the plan illustrated by the location survey.

Also, if he is to learn how to survey, he must learn the principles behind surveying. He needs to be able to apply plane trigonometry and to make accurate computations. How to compute railroad curves is important. He must be able to think in three dimensions to understand the geometry of the instruments. He must understand the optical principles of the instruments, as well as their care. The physics involved in refraction, the coefficient of expansion, gravity, and a knowledge of astronomy are important to him. The theory of stadia reduction cannot be overstressed.

These objectives must be covered by the course in surveying, and yet none of these things actually teach the student how to survey. The surveying instructor must sit down to plan a course in surveying which will cover all the objectives (these are not completely listed above), as well as teach the student how to survey, but without utilizing more student-hours than can be assigned to this work.

The time available for all surveying and mapping courses usually constitutes the equivalent of five ordinary working weeks. Perhaps there are some organizations other than universities where a man is trained in these various things in this length of time. He is put to work and in five weeks he has learned them all. If he were fortunate enough to get a job during the summer with such an organization, he could repeat his entire surveying course two and one-half times. When considered in this light, it is astounding what can be done by the "cut-and-try" methods of education. The success of the present methods of education depends upon the years of thought

and experiment that have been applied to the problem. When an employer complains that a student is not properly qualified for the job at hand, or criticism is heaped on the head of the educator, the answer must always be, "Let the men who criticize try to do better in the same length of time with the same age group."

Surveying along with engineering drafting is a course which trains a student to do something by which he can earn his daily bread. It provides him with an entering wedge into the profession of civil engineering. His first job is almost invariably as a surveyor or a draftsman. It is one of the two courses which must train a man not only in principles but in actual practice.

Nearly everyone here has taken courses in surveying at a university. Some have taught them for years. If experiences are compared, it will be found that these courses are almost identical. This may be caused by inertia on the part of the educators, but it is my belief that the courses have crystalized under the pressure of necessity and that perforce the best courses have survived. It would be useless to describe these courses here as they are obviously familiar to all of you, but it is well to sound a warning to its critics. Surveying courses constitute a most important link in the educational chain, and radical changes in the procedure and the course content are far more likely to destroy than to improve a product so well tempered by time.

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AIR PHOTOGRAPHS IN HYDROGRAPHIC SURVEYING

An incident which occurred during surveys by the U. S. Coast and Geodetic Survey along the northern coast of California, conducted by the Ship *Guide,* served to demonstrate the practical use of air photographs in hydrography.

An uncharted breaker was reported by the wire-drag party to be approximately three-fourths mile south of False Cape Rock near Cape Mendocino. Since the weather was thick at the time, the party was unable to fix the position of the breaker. When the weather cleared, the area was investigated by running a series of sounding lines spaced 50 meters apart but not a single indication of shoaling was obtained, the general depths being from 9 to 12 fathoms. At a later date, some air photographs of the locality were obtained which had been taken at very low tide during a heavy northwesterly swell. These photographs showed what appeared to be a breaker near the reported position and two additional breakers about ¼ mile to the northward.

A rough compilation of the area from Steamboat Rock to the vicinity of False Cape Rock was made and the breakers located on celluloid by radial plot. These positions were transferred to the hydrographic boat sheet and the exact locations, as obtained from the photographs, examined by the hydrographic party. The search revealed a rock covered by only 10 feet of water near the place reported by the wire-drag party and at the two breakers to the northward two rocks, covered by 10 and 19 feet, respectively, were found.—*"Field Engineers Bulletin," No. 12, U. S. C. & G. S.*

"ELLICOTT STONE"

MORTON J. SAVELLE, Alabama Geodetic Survey

The following is a description of a marker, with considerable historical value, that was established by Andrew Ellicott[1] in 1799. Its exact geographic position was determined by the U. S. Coast and Geodetic Survey in December, 1938, and it was found to be 862.55 feet south and 7057.16 feet west of the Ellicott determination. Considering the instruments of that day, the limitations in the methods of determining longitude, and the fact that the traverse was run for a distance of 180 to 200 miles through unmapped wilderness, the Ellicott position showed a remarkable degree of accuracy.—EDITOR.

FLORIDA, originally settled by the Spaniards, was held as a Spanish possession for nearly 200 years. In 1762 it was ceded by Spain to Great Britain, who divided it into the two provinces of East and West Florida, separated by the Apalachicola River.

By the Treaty of 1783 between Great Britain and the United States and her allies—France and Spain—Great Britain acknowledged the independence of the Colonies, and recognized as a part of their southern boundaries a line running due east from a point in the Mississippi River along the 31st parallel to a point in the middle of the Apalachicola River. At the same time, by a separate agreement, the two Floridas were ceded to Spain, but without defining their northern boundaries. This omission gave rise to a long continued dispute between Spain and the United States as to their respective limits. Spain contended that the northern boundary of West Florida had been fixed at the line running due east from the mouth of the Yazoo River to the Chattahoochee, and that all territory south of that line belonged to her. The United States, just as positively, maintained that its southern boundary extended to the 31st parallel, 110 miles further south than the boundary line claimed by Spain.

In 1795 the United States, through its Ambassador to Spain, Thomas Pinckney Andrews, prevailed on the King of Spain to allow the establishment of the southern boundary of the United States, dividing its territory from the Spanish colonies of East and West Florida, this boundary to be the 31st parallel of north latitude, beginning at a point on the Mississippi River, thence extending due east to the middle of the Apalachicola River, thence along the middle thereof to its junction with the Flint River, thence straight to the head of St. Mary's River, and thence down the middle thereof

[1] Andrew Ellicott was identified with the planning of the City of Washington and with the location of most of the important boundary lines of the United States up to about 1812. From 1812 until his death in 1820 he held the chair of mathematics at West Point Military Academy.

to the Atlantic Ocean. Andrew Ellicott, then Surveyor General of the United States was one of the Commissioners appointed to settle this boundary. On March 29, 1798, from a dismal swamp at Tunica Bayou, where the 31st parallel crosses the Mississippi River, Mr. Ellicott started his survey. He was soon joined by Major Stephen Minor and Sir William Dunbar, Commissioners for Spain. Troops for protection from the Indians were furnished by Spain and the United States. These troops, with pack horses, woodsmen, and laborers had all the appearance of an invading army.

From the beginning of the survey, almost insurmountable obstacles were encountered, for the line ran through swamps, creeks, and rivers. Mile markers were established by blazing trees and piling up huge mounds of dirt. How well these pioneer engineers worked is shown by the fact that in 1847, when the Florida-Alabama boundary line was established it followed the line of blazed trees and mounds of the Ellicott survey, which was still referred to as "Ellicott's Line," or the "Mound Line." To this day, many of these mounds can be found along the Alabama-Florida boundary. On March 18, 1799, the Ellicott party reached the point now marked by the "Ellicott Stone." Instruments were set up, and observations were completed by April 9, 1799. Upon checking the work with a Hadley sextant, the point from which the observations were made was found to be on the 31st parallel and the 88th meridian. To mark this spot, the party placed a sandstone slab, projecting about 3 feet above the ground. On the north side of the stone is inscribed "U. S. Latitude 31°, 1799," and on the south side is "Dominios de S. M. Carlos, Latitude 31°, 1799."

With the placing of this stone, however, the troubles of the surveyors were by no means ended. Considerable difficulty was experienced in crossing the Mobile River with its extensive swamps. Signals had to be erected upon high land on either side of the river. Flags and tremendous bonfires were employed in these signals. The woods caught on fire and burned until rain fell. After crossing the river the party met with more difficulties. The Creek Indians refused to let them cross their territory, but finally agreed to a meeting at Miller's Bluff, on the banks of the Conecua River, where the agents of the United States and Spain addressed the Indians across the river. After being reassured by the Spanish agents, the Indians consented to allow the party to cross the river.

This survey cost approximately $300,000.00, about half of which was paid by the United States and half by Spain. About 2 years were required for its completion.

Some years ago, Mr. J. T. Searcy, of Tuscaloosa, Alabama, came across

this stone. He found it in bad condition, as souvenir hunters had chipped bits from the edges until it is now of very irregular outline. Realizing the historical value of this marker, Mr. Searcy erected a sign giving the name of the stone. Some time later the stone was found broken almost in two, and Mr. Lewis Donald, a member of the Iberville Historical Society, cemented it back together, and built a heavy steel fence around it, on which the name "Ellicott Stone" appears. The stone stands approximately 23 miles north of Mobile, Alabama and 1 mile north of Salco Station, on the Southern Railway.

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A Rhyme in Deed!

The following title deed in poetry, legal in every way, is actually on record at Beardstown, Cass County, Illinois.—EDITOR.

I, J. Henry Shaw, the grantor herein,
Who lives at Beardstown, the county within,
For seven hundred dollars to me paid today
By Chas. E. Weyman, do sell and convey
Lot two (2) in block forty, said county and town,
Where the Illinois River flows placidly down,
And warrant the title forever and eye
Waiving homestead and mansion to both a goodbye
And pledging this deed is valid in law
I add here my signature, *J. Henry Shaw.* (Signed)
Dated, July 25, 1881.

* * *

I, Sylvester Emmons, who lives at Beardstown,
A Notary Public of fame and renown
Of the County of Cass in Illinois State,
Do certify here that on the same date
One J. Henry Shaw to me did make known
That the above deed and name were his own;
And he stated, he sealed and delivered the same
Voluntarily, freely, and never would claim
His homestead therein; but left all alone,
Turned his face to the street and his back to his home.
(Signed) *S. Emmons,*
Dated Aug. 1, 1881. Notary Public.
(Seal)

—From Kagey on "Land Surveys and Titles."

GEODETIC VERSUS ASTRONOMIC CONTROL

H. W. HEMPLE, Asst. Chief, Div. of Geodesy, U. S. C. & G. S.

MANY ENGINEERS and surveyors are inclined to use loosely and interchangeably the terms "geodetic control" and "astronomic observations." For example, a recent article referred to "the establishment of geodetic control by astronomic methods." Such a statement is somewhat misleading and needs clarification.

Geodetic surveys are those in which the curvature of the earth is taken into account. If the earth were a true sphere, and its structure homogeneous, astronomic observations for determination of position would be adequate within the limits of accuracy imposed by the type of instrument used. Unfortunately, the earth is not a true sphere and astronomic observations are dependent upon the position of the plumb line at the station. The direction of the plumb line is affected by surrounding topographic masses, and astronomic observations made with reference to the plumb line are therefore independent of the size and shape of the earth. If the plumb line at the station at which observations are being made is deflected, the values of latitude and longitude obtained are directly affected. Large deflections of the vertical are not unusual and astronomic observations for determination of position are apt to diverge from the geodetic position by an amount varying from several hundred feet to a mile. An instance often cited is that for the island of Puerto Rico, having a width of 35 miles, where the astronomic determination of points on the north and the south sides of the island gave a distance between these points at variance with the geodetic determination by about a mile.

For the establishment of geodetic control, a spheroid closely approximating the actual shape of the earth is adopted, to which all survey computations are referred. In addition, an initial point is selected for which the latitude, longitude, and azimuth to an adjacent station, are determined. From this point a continuous scheme of surveys, consisting of triangulation or traverse, is extended. All positions of stations for these surveys are computed on the adopted spheroid. This scheme is then geodetically controlled, and all points located thereon are in their correct relationship one to another.

If rigid control is required for surveying and mapping, astronomic observations alone are not satisfactory. If errors, which may vary from a few hundred feet to as much as a mile, are not of importance for the type of surveying and mapping being done, then the use of astronomic observations may be justified and satisfactory. However, this method must not be considered as having the accuracy of geodetic control.

CONGRESS NEWS

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REGION 8

Vice President H. R. Saunders has furnished the following information regarding the showing of the color film, "Cartographic Activities in the United States," in his Region:

I have shown the picture to five different groups at Sherman Oaks, California comprising a total audience of probably two hundred and fifty. This was particularly encouraging as a good many agencies were represented. Among them were city, county, state, and federal employees, the Auto Club of Southern California, railway, utility, and oil company employees, and private surveyors. The picture elicited so much favorable comment that I am still receiving requests to show it. The City Engineer had chairs placed in the vault, where records are kept and which is the only room which can be darkened, and whenever there are a dozen or more who wish to see it I arrange a showing at the noon hour. The film was shown at the University of Southern California on September 11.

LOS ANGELES LOCAL SECTION

The Los Angeles Section of Region 8 held its quarterly meeting on Wednesday, August 18 in the club rooms of the Y.M.C.A. Vice President H. R. Saunders of the Region opened the meeting. After welcoming the members and guests, Mr. Saunders noted that the meeting was attended by members of several other organizations, whose interests and activities are related to those of the Congress, namely the California Land Survey Association, the Draftsmen Association, and the Engineers and Architects Association of Southern California.

Mr. Saunders spoke on the background of the Congress, outlining its objectives and policies, and emphasized the advantage to be gained from a publication that will serve as a forum for the surveying and mapping profession. He urged all those having any interest in the welfare of the profession to join the Congress on Surveying and Mapping and participate in its activities. Mr. William C. Wattles, of the Title Insurance and Trust Company, was then introduced as temporary chairman of the Section.

Mr. Wattles reviewed the need for better trained and better qualified personnel among those practicing land surveying. He spoke on some of

the earlier organizations which had worked for the interests of the surveying fraternity, and outlined some of the good which the Congress could accomplish with the undivided support of those following this profession.

A feature of the meeting was the showing of the color film "Cartographic Activities in the United States." Many favorable comments were expressed on the educational value of the film, several of the members voicing a desire to view more pictures of this nature showing more of the details of the techniques used by the map-producing agencies.

Before the meeting was adjourned, some back issues of the Bulletin and some membership applications were distributed, and the cooperation was requested of those present in securing new members. A number of questions were asked regarding the Congress and altogether there was much interest and enthusiasm.

The meeting was attended by thirty members and guests.

C. E. HANSON,
Acting Secretary.

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NEW VICE PRESIDENT FOR REGION 3

PROFESSOR RALPH P. BLACK of the Department of Civil Engineering at the Georgia School of Technology has been named Vice President of Region 3, and by virtue of the office automatically becomes a member of the Board of Direction of the Congress. Professor Black fills the vacancy left by Mr. George D. Whitmore upon his elevation to the presidency.

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"THE SET-UP"—A MONTHLY TVA NEWSPAPER

The employees of the Maps and Surveys Division of the Tennessee Valley Authority, of which many are members of the American Congress on Surveying and Mapping, have recently begun the publication of a monthly newspaper for distribution to employees of the Division who have gone into the armed forces. Its primary purpose is to provide a means of contact between those in the Service, and to keep them informed on the happenings at home. The second number included the current mailing address of each employe in the Service. The paper is published and distributed at no expense to the Government.

AERIAL PHOTOGRAMMETRY SEMINAR

The first Seminar in Aerial Photogrammetry was held at Michigan State College during August 16, 17, and 18 of 1943. The Seminar was conceived by Professor J. E. Meyer of Michigan State College and sponsored by the Committee on Surveying and Mapping of the Society for the Promotion of Engineering Education, the Civil Engineering Department of M. S. C., and the Abrams Aerial Survey Corporation. The American Congress on Surveying and Mapping was well represented both among the speakers and guests.

Of the sessions themselves, Professor Earnest, Chairman of the Committee on Surveying and Mapping of SPEE and a Director of Region 4, writes:

The fact that 135 registrants (many of whom traveled from distant places) were in attendance reflects the accumulated interest in this highly specialized field. It would be difficult to point out highlights of the Seminar, since the program was packed with prominent speakers with interesting subjects. Practically the entire field of Photogrammetry, from cameras to the use of reproduced maps, was covered. In addition to the regular sessions, interesting features included a trip through the Abrams Aerial Survey Corporation's plant, a dinner meeting at the Hotel Olds, and an evening allotted to instruction in the use of plotting instruments.

Obituaries

WALTER FORD REYNOLDS, well known for his contributions to the science of geodesy, died on May 1, 1942. He was a native of Baltimore, Maryland, and was graduated from Johns Hopkins University in 1902. He entered in the service of the United States Coast and Geodetic Survey in 1907 and, with a natural talent for mathematics, became an authority in the computation and adjustment of complex first-order triangulation. From 1924 until his death he was Chief of the Section of Triangulation, in charge of computing the great volume of triangulation done by the Survey during that time. He prepared two official manuals on geodetic surveying, and compiled a number of publications tabulating the results of triangulation in various states.

Mr. Reynolds was quiet and friendly in manner, inspiring confidence in all who came in contact with him. In his youth he was the manager of a baseball team, and he never became so submerged in geodesy as to lose his intense interest in the great American game. He is survived by Mrs. Reynolds, a daughter, and two sons.

EDWARD S. RICKARD, Topographic Engineer, died of pneumonia in Fresno, California, on February 21, 1942. Mr. Rickard was appointed in a classified position in the United States Geological Survey in 1920, and was selected thereafter for a wide variety of topographic mapping assignments in the more rugged regions of the West. He loved the outdoor work in mountainous country, and soon became proficient not only in his engineering work but also in managing field parties in true Western camp and pack-train manner.

The death of Mr. Rickard, who was only 42 years old and the head of a fine family, with a promising career ahead of him, was a keen loss to the engineering profession and to human society. He is survived by Mrs. Rickard, three sons, and a daughter.

—R. M. WILSON

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NOTE:—This list supplements the list of members published in the April-May, 1942 Bulletin. Hereafter names will be published as accepted by the Committee on Admissions.

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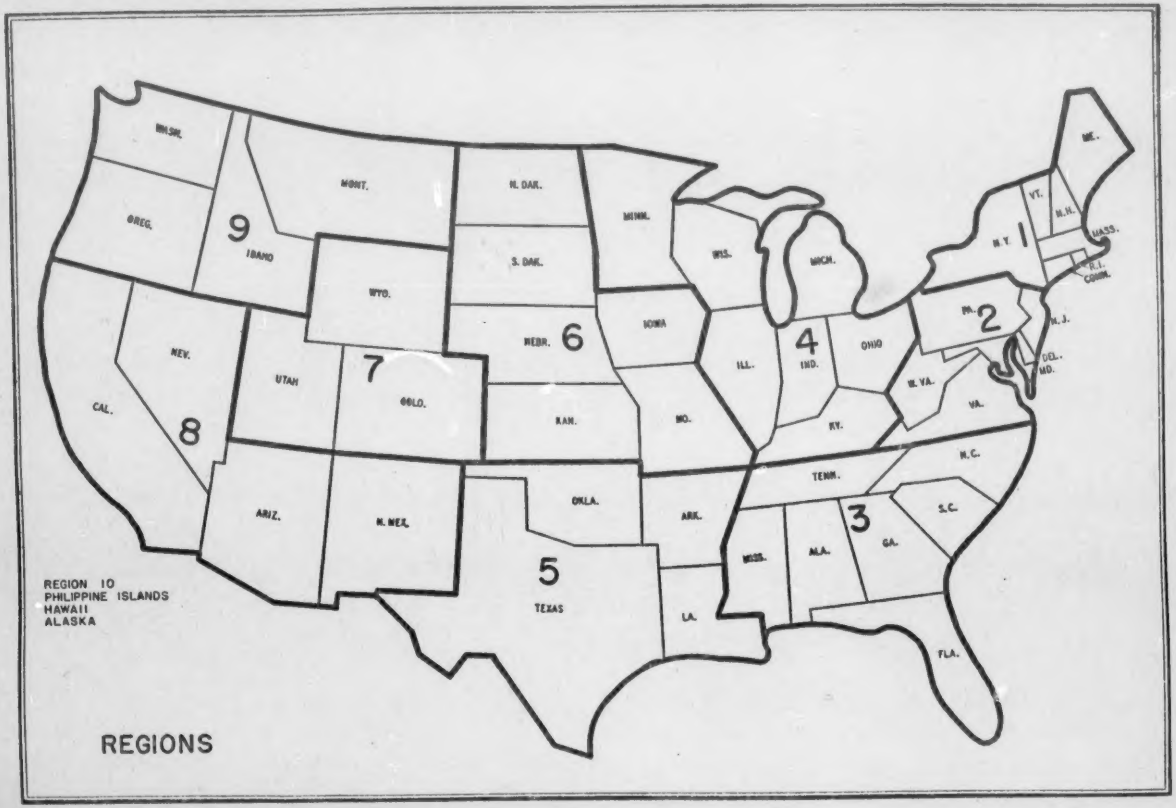
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